

alight during an emergency. Moreover, the butterfly's camouflaging capability decides whether it needs to perch above or below a leaf.

The selection of a roosting site thus seems to be governed by a combination of defence strategies against nocturnal predators and

instinctive behaviour to cope with harsh weather.

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30. BIOLOGICAL CONTROL OF DISEASE TRANSMITTING FRESHWATER LEECHES *HEMICLEPSIS MARGINATA MARGINATA* (MULLER) ANNELIDA: GLOSSIPHONIIDAE

Because of their habit of sucking blood from man and economically important animals, and participation in spreading protozoan and helminth diseases in the concerned hosts, sanguivorous leeches have drawn the attention of a number of workers, Davies and Everett 1975, Mandal 1984. In India, the sanguivorous leech *Hemiclepsis marginata marginata* poses a serious threat to pisciculture, froggery and turtle fisheries in so far as occurrence and spread of haematozoan diseases are concerned. During the course of rearing *H. marginata* in the laboratory, destruction of eggs of this leech by a fungal strain (*Anguillospora* sp.: Moniliaceae) has been noted repeatedly and an account of the same is given below.

Of the 10 egg-bearing *H. marginata*, an unusual colouration of the body colour of five leeches and the eggs of these individuals was noted on January 15, 1990. On January 18, 1990 the colour of these eggs changed from white (original, normal colour of the eggs) to green. On January 21 and 22, 1990 all the eggs from the body of the five leeches dropped to the bottom of the container. These eggs were left undisturbed but the water of the container was regularly replaced by fresh pond water. The mother leeches gradually became sluggish and greenish. They did not even move to attack fishes to suck blood. Of the five, one died on January 27, three on January 28, and the last one died on January 29, 1990. The eggs did not hatch during the 16 days following detachment from the mother leeches

and finally became denatured and decomposed. Five other leeches thrived in the same container, their eggs hatched in due course and the hatchlings were normal and healthy.

Subsequently, in other containers, a similar type of fungal infection was seen in eggs and egg-bearing leeches. Experiments were initiated to find out whether the leeches, irrespective of age and life stages, are susceptible to attack by fungal parasites, or whether the attack is confined to egg-bearing leeches. Ten individuals in the categories of three age-groups, viz. 7-10 days, 30-33 days and 90-93 days from the laboratory stock were used. All the 90-93 day-old leeches had an elongated white patch on the ventral side of the body where the eggs remain attached until they hatch and the hatchlings are detached. The individuals in the three age-groups were released separately in three museum jars, each holding one litre of pond water. Five egg-bearing, fungus infected leeches were released in each jar.

The leeches belonging to 7-10 and 30-33 day age-groups were free from fungal infection for nine days during which, however, all the fungus infected leeches died. But six individuals out of 10 belonging to the 90-93 day age-group became infected by the fungal parasites. In all cases, the initial site of infection was either the eggs or the outer covering of the cocoon. Subsequently, this spread towards the anterior sucker. The infected leeches then became inactive and were seen hanging somehow on to the wall of the jar with the help of their posterior sucker.

All the eggs became detached from the mother's body between the 4th and 6th days after the day on which the leeches became infected. All the six individuals died within a fortnight. The remaining four leeches were free from fungal attack. The hatchlings produced from their eggs were also free from any disease. They grew well and reproduced in due course of time.

Egg-bearing *H. marginata* are thus susceptible to attack by the fungal parasite *Anguillospora* sp. It appears that these fungi find the material surrounding the egg or cocoon a suitable medium for growth and multiplication. With the progress of infection, the eggs and the tissues keeping the eggs in contact with the body of the leech succumbed to the fungus. The fungi perhaps make their way into the body of the leeches through these tissues and finally kill them. Whatever be the mode of attack and nature of spreading, it is evident that these microbes are effective in reducing the numbers of leech

H. marginata to a considerable degree. Spelling and Young (1986) have also noted mortality in older leeches *Erpobdella octoculata* due to infestation by the trematode parasites *Apatemon gracilis* in Europe. It appears that survival of many leeches is threatened by some parasites and the fungal strain *Anguillospora* sp. can be utilised in the biological control of *Hemiclepsis marginata marginata*.

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31. ON *CHYDORUS FAVIFORMIS* BIRGE, 1893 FROM WEST BENGAL (CRUSTACEA: CLADOCERA: CHYDORIDAE)

(With six text-figures)

During the course of a wetland survey during 1992-93, we came across several specimens of a cladoceran, *Chydorus faviformis* Birge in the Kashipur Hoogla Jhill, Howrah District, West Bengal (22°N, 88° E). In India it was first reported from Kashmir (Khan *et al.* 1978). Michael and Sharma (1988) subsequently reported this species from Shillong. It also occurs

in Argentina, U.S.A., China and Malaysia.

Family	CHYDORIDAE
Subfamily	Chydorinae
Genus	<i>Chydorus</i>

Chydorus faviformis Birge, 1893 (Figs.1-6)
Female: Body length 0.43 to 0.47 mm;